WHAT IS CLAIMED IS:

1. A high-frequency diode oscillator comprising:

a metal member which is disposed between parallel plate conductors disposed at an interval equal to or less than one half of wavelength λ of a high-frequency signal,

the metal member being provided with a high-frequency diode which oscillates a high-frequency signal,

a choke-type bias supply strip comprising wide strips and narrow strips which are alternately arranged, and

a strip conductor for linearly connecting the choke-type bias supply strip to the high-frequency diode; and

a dielectric strip for receiving and propagating the high-frequency signal, which is disposed in a vicinity of the high-frequency diode between the parallel plate conductors,

length of the strip conductor being set to approximately $\{(3/4) + n\}\lambda$ (n represents an integer of 0 or more), and

length of the wide strips and narrow strips of the choke-type bias supply strip being set to approximately $\lambda/4$.

2. The high-frequency diode oscillator of claim 1, wherein a dielectric chip having a main surface opposed to a main surface of the strip conductor is disposed in proximity to the strip conductor to be electromagnetically coupled thereto.

3. The high-frequency diode oscillator of claim 1, wherein

a length of the strip conductor is within a range of approximately $3\lambda/4$ to approximately $\{(3/4) + 3\}\lambda$.

4. The high-frequency diode oscillator of claim 1, wherein a length of the strip conductor is within a range of $\{(3/4) + n\}\lambda \pm 20\%$.

5. The high-frequency diode oscillator of claim 1, wherein the choke-type bias supply strip and the strip conductor are made of Cu, Al, Au, Ag, W, Ti, Ni, Cr, Pd or Pt.

6. The high-frequency diode oscillator of claim 2, wherein the dielectric strip and the dielectric chip are made of cordierite ceramics or alumina ceramics.

7. The high-frequency diode oscillator of claim 2, wherein an interval between the main surface of the dielectric chip and the main surface of the strip conductor is in a range of 0.1 mm to 1.0 mm.

8. The high-frequency diode oscillator of claim 1, wherein the metal member has a hole formed at a position corresponding to the strip conductor, and a column-like frequency regulating member which is inserted into the hole and disposed in proximity to the strip conductor so that an end thereof protrudes from

a surface of the metal member.

9. The high-frequency diode oscillator of claim 8, wherein the frequency regulating member is made of cordierite ceramics, alumina ceramics, Cu, Al, Fe or stainless steel.

10. The high-frequency diode oscillator of claim 8, wherein an interval between the frequency regulating member and the strip conductor is in a range of 0.05 to 0.10 mm.

11. The high-frequency diode oscillator of claim 8, wherein an area of an end surface of the frequency regulating member opposed to the strip conductor is in a range of 0.10 mm^2 to 2.0 mm^2.

12. The high-frequency diode oscillator of claim 1, wherein a frequency modulating diode whose bias voltage applying direction is set to a direction parallel to an electric field generated at the strip conductor is disposed in proximity to the strip conductor to be electromagnetically coupled thereto.

13. The high-frequency diode oscillator of claim 12, wherein the frequency modulating diode is mounted on a modulation circuit board composed of a wiring board having a main surface perpendicular to the parallel plate conductors on which main

surface a second choke-type bias supply strip is formed, and an auxiliary board which stands on a mid-portion of the second choke-type bias supply strip and has a main surface on which a connection conductor connected to the second choke-type bias supply strip is formed, and the frequency modulating diode is connected to a mid-portion of the connection conductor on the auxiliary board.

14. The high-frequency diode oscillator of claim 12, wherein an interval between the frequency modulating diode and the strip conductor is set to the wavelength λ or less.

15. The high-frequency diode oscillator of claim 12, wherein a position of the frequency modulating diode with respect to the strip conductor is within a range of one quarter the length of the strip conductor toward the high-frequency diode or choke-type bias supply strip from a center of the strip conductor.

16. The high-frequency diode oscillator of claim 1, wherein a through hole is formed in the vicinity of the strip conductor on at least one of the parallel plate conductors, and a column-like frequency regulating member which is protruded from a surface of one of the parallel plate conductors which surface confronts a surface of the other of the parallel plate conductors

to be electromagnetically coupled thereto is disposed in the through hole.

17. The high-frequency diode oscillator of claim 16, wherein a distance between the frequency regulating member and the strip conductor is one half of the wavelength λ or less.

18. The high-frequency diode oscillator of claim 16, wherein a shape of the protrusion of the frequency regulating member is tapered.

19. The high-frequency diode oscillator of claim 16, wherein the frequency regulating member is made of cordierite ceramics, alumina ceramics, Cu, Al, Fe or stainless steel.

20. The high-frequency diode oscillator of claim 16, wherein an area of a surface of the frequency regulating member opposed to the strip conductor is in a range of 0.5 to 3.0 mm^2.

21. A millimeter-wave transmitting/receiving apparatus comprising:

parallel plate conductors disposed at an interval equal to or less than one half of wavelength of a transmission millimeter-wave signal; and

the following parts disposed between the parallel plate

conductors:

(a) a high-frequency diode oscillator for outputting millimeter-wave signals, including:

a metal member on which a high-frequency diode for oscillating high-frequency signals, a choke-type bias supply strip for supplying a bias voltage to the high-frequency diode, the choke-type bias supply strip comprising wide strips and narrow strips which are alternately arranged, and a strip conductor for linearly connecting the choke-type bias supply strip and the high-frequency diode are disposed, and

a dielectric strip disposed in a vicinity of the high-frequency diode, for receiving and propagating the millimeter-wave signals,

lengths of the wide strips and narrow strips of the choke-type bias supply strip being set to approximately $\lambda/4$ (λ represents a wavelength of a high-frequency signal), respectively,

a length of the strip conductor being set to approximately $\{(3/4) + n\}\lambda$ (n represents an integer of 0 or more);

(b) a first dielectric strip having one end where the high-frequency diode is disposed, for propagating a millimeter-wave signal outputted from the high-frequency diode oscillator;

(c) a variable capacitance diode disposed so that a bias voltage applying direction coincides with an electric field

direction of the millimeter-wave signal, for periodically controlling a bias voltage and thereby outputting the millimeter-wave signal as a frequency-modulated transmission millimeter-wave signal;

(d) a second dielectric strip having one end which is disposed in proximity to or joined to a portion of the first dielectric strip on a downstream side from the variable capacitance diode in a transmitting direction of the transmission millimeter-wave signal, so as to be electromagnetically coupled with the portion;

(e) a circulator having an input end, an input/output end and an output end,

the other end of the first dielectric strip being coupled with the input end,

a transmission millimeter-wave signal inputted to the input end being outputted to the input/output end,

a reception signal inputted to the input/output end being outputted to the output end;

(f) a third dielectric strip having one end which is coupled to the input/output end of the circulator, and another end where a transmission/reception antenna is disposed;

(g) a fourth dielectric strip having one end which is coupled with the output end of the circulator; and

(h) a mixer for mixing signals transmitted to the second and fourth dielectric strips, and generating intermediate-

frequency signals by disposing in proximity to each other or joining a mid-portion of the second dielectric strip and a mid-portion of the fourth dielectric strip so as to be electromagnetically coupled to each other.

22. A millimeter-wave transmitting/receiving apparatus comprising:

parallel plate conductors disposed at an interval equal to or less than one half of wavelength of a transmission millimeter-wave signal; and

the following parts disposed between the parallel plate conductors:

(a) a high-frequency diode oscillator for outputting millimeter-wave signals, including:

a metal member on which a high-frequency diode for oscillating high-frequency signals, a choke-type bias supply strip for supplying a bias voltage to the high-frequency diode, the choke-type bias supply strip comprising wide strips and narrow strips which are alternately arranged, and a strip conductor for linearly connecting the choke-type bias supply strip and the high-frequency diode are disposed, and

a dielectric strip disposed in a vicinity of the high-frequency diode, for receiving and propagating the millimeter-wave signals,

lengths of the wide strips and narrow strips of the

choke-type bias supply strip being set to approximately $\lambda/4$ (λ represents a wavelength of a high-frequency signal), respectively,

a length of the strip conductor being set to approximately $\{(3/4) + n\}\lambda$ (n represents an integer of 0 or more);

(b) a first dielectric strip having one end where the high-frequency diode is disposed, for propagating a millimeter-wave signal outputted from the high-frequency diode oscillator;

(c) a pulse modulation diode disposed to be interposed in or attached to the first dielectric strip so that a bias voltage applying direction coincides with an electric field direction of the millimeter-wave signal, for outputting a transmission millimeter-wave signal obtained by pulse-modulating the millimeter-wave, by on-off of a bias voltage;

(d) a second dielectric strip having one end which is disposed in proximity to or joined to a portion of the first dielectric strip on an upstream side from the pulse modulation diode in a transmitting direction of the transmission millimeter-wave signal, so as to be electromagnetically coupled with the portion;

(e) a circulator having an input end, an input/output end and an output end,

the other end of the first dielectric strip being coupled with the input end,

a transmission millimeter-wave signal inputted to the input end being outputted to the input/output end,

a reception signal inputted to the input/output end being outputted to the output end;

(f) a third dielectric strip having one end which is coupled to the input/output end of the circulator, and another end where a transmission/reception antenna is disposed;

(g) a fourth dielectric strip having one end which is coupled with the output end of the circulator; and

(h) a mixer for mixing signals transmitted to the second and fourth dielectric strips, and generating intermediate-frequency signals by disposing in proximity to each other or joining a mid-portion of the second dielectric strip and a mid-portion of the fourth dielectric strip so as to be electromagnetically coupled to each other.

23. A millimeter-wave transmitting/receiving apparatus comprising:

parallel plate conductors disposed at an interval equal to or less than one half of wavelength of a transmission millimeter-wave signal; and

the following parts disposed between the parallel plate conductors:

(a) a high-frequency diode oscillator for outputting millimeter-wave signals, including:

a metal member on which a high-frequency diode for oscillating high-frequency signals, a choke-type bias supply strip for supplying a bias voltage to the high-frequency diode, the choke-type bias supply strip comprising wide strips and narrow strips which are alternately arranged, and a strip conductor for linearly connecting the choke-type bias supply strip and the high-frequency diode are disposed, and

a dielectric strip disposed in a vicinity of the high-frequency diode, for receiving and propagating the millimeter-wave signals,

lengths of the wide strips and narrow strips of the choke-type bias supply strip being set to approximately $\lambda/4$ (λ represents a wavelength of a high-frequency signal), respectively,

a length of the strip conductor being set to approximately $\{(3/4) + n\}\lambda$ (n represents an integer of 0 or more);

(b) a first dielectric strip having one end where the high-frequency diode is disposed, for propagating a millimeter-wave signal outputted from the high-frequency diode oscillator;

(c) a variable capacitance diode disposed so that a bias voltage applying direction coincides with an electric field direction of the millimeter-wave signal, for periodically controlling a bias voltage and thereby outputting the millimeter-wave signal as a frequency-modulated transmission

millimeter-wave signal;

(d) a second dielectric strip having one end which is disposed in proximity to or joined to a portion of the first dielectric strip on a downstream side from the variable capacitance diode in a transmitting direction of the transmission millimeter-wave signal, so as to be electromagnetically coupled with the portion;

(e) a circulator having an input end, an input/output end and an output end,

the other end of the first dielectric strip being coupled with the input end,

a transmission millimeter-wave signal inputted to the input end being outputted to the input/output end,

a reception signal inputted to the input/output end being outputted to the output end;

(f) a third dielectric strip having one end which is coupled to the input/output end of the circulator, and another end where a transmission antenna is disposed;

(g) a terminator coupled to the output end of the circulator;

(h) a fourth dielectric strip having one end where a reception antenna is disposed, for guiding a received millimeter-wave signal; and

(i) a mixer for mixing signals transmitted to the second and fourth dielectric strips, and generating intermediate-

frequency signals by disposing in proximity to each other or joining a mid-portion of the second dielectric strip and a mid-portion of the fourth dielectric strip so as to be electromagnetically coupled to each other.

24. A millimeter-wave transmitting/receiving apparatus comprising:

parallel plate conductors disposed at an interval equal to or less than one half of wavelength of a transmission millimeter-wave signal; and

the following parts disposed between the parallel plate conductors:

(a) a high-frequency diode oscillator for outputting millimeter-wave signals, including:

a metal member on which a high-frequency diode for oscillating high-frequency signals, a choke-type bias supply strip for supplying a bias voltage to the high-frequency diode, the choke-type bias supply strip comprising wide strips and narrow strips which are alternately arranged, and a strip conductor for linearly connecting the choke-type bias supply strip and the high-frequency diode are disposed, and

a dielectric strip disposed in a vicinity of the high-frequency diode, for receiving and propagating the millimeter-wave signals,

lengths of the wide strips and narrow strips of the

choke-type bias supply strip being set to approximately $\lambda/4$ (λ represents a wavelength of a high-frequency signal), respectively,

a length of the strip conductor being set to approximately $\{(3/4) + n\}\lambda$ (n represents an integer of 0 or more);

(b) a first dielectric strip having one end where the high-frequency diode is disposed, for propagating a millimeter-wave signal outputted from the high-frequency diode oscillator;

(c) a pulse modulation diode disposed to be interposed in or attached to the first dielectric strip so that a bias voltage applying direction coincides with an electric field direction of the millimeter-wave signal, for outputting a transmission millimeter-wave signal obtained by pulse-modulating the millimeter-wave, by on-off of a bias voltage;

(d) a second dielectric strip having one end which is disposed in proximity to or joined to a portion of the first dielectric strip on an upstream side from the pulse modulation diode in a transmitting direction of the transmission millimeter-wave signal, so as to be electromagnetically coupled with the portion;

(e) a circulator having an input end, an input/output end and an output end,

the other end of the first dielectric strip being coupled with the input end,

a transmission millimeter-wave signal inputted to the input end being outputted to the input/output end,

a reception signal inputted to the input/output end being outputted to the output end;

(f) a third dielectric strip having one end which is coupled to the input/output end of the circulator, and another end where a transmission antenna is disposed;

(g) a terminator coupled to the output end of the circulator;

(h) a fourth dielectric strip having one end where a reception antenna is disposed, for guiding a received millimeter-wave signal; and

(i) a mixer for mixing signals transmitted to the second and fourth dielectric strips, and generating intermediate-frequency signals by disposing in proximity to each other or joining a mid-portion of the second dielectric strip and a mid-portion of the fourth dielectric strip so as to be electromagnetically coupled to each other.